UNIVERSITY OF AMSTERDAM

VU VRIJE UNIVERSITEIT AMSTERDAM

FACULTY OF SCIENCE

TEACHING AND EXAMINATION REGULATIONS

PART B: programme-specific section

Academic year 2016-2017

MASTER'S PROGRAMME COMPUTATIONAL SCIENCE (JOINT DEGREE)
MASTER'S PROGRAMME COMPUTATIONAL SCIENCE (SINGLE DEGREE)

Version 2 May 2016

Chapter 1. General Provisions

Article 1.1 – Definitions

In addition to part A, the following definitions are used in part B

Personal Education Plan (PEP)	An individual study plan for the student's Master programme.

Article 1.2 – Study programme information

1. The Master's programme Computational Science, CROHO number 65015 (joint degree) and CROHO number 60299 (single degree), is offered on a full-time basis and the language of instruction is English. This means that the Code of Conduct for Foreign Languages at the UvA applies for this programme (see Code of Conduct Governing Foreign Languages at the University of Amsterdam 2000 at the website: http://www.uva.nl/en/about-the-uva/uva-profile/rules-and-regulations/teaching/teaching.html).
2. The programme consists of a two-year programme with a total study load of 120 EC.
3. Each student should submit their intended course schedule to the programme director (or manager) prior to the start of each semester. Any changes in the student's curriculum have to be approved by the programme director.
4. Students are required to have their personalised curriculum approved by the study advisor and the Examinations Board prior to starting their Master Thesis.

Article 1.3 – Enrolment

The programme is offered starting in the first semester of the academic year (1 September).

Chapter 2. Programme objectives and exit qualifications

Article 2.1 – Programme objectives

The objectives of the Master Computational Science programme at the University of Amsterdam are as follows:

1. To educate students at an academic level to the degree of Master of Science in Computational Science, in order to become active members of the scientific research community in academic institutions as well as in advanced research and development environments.
2. To attain a final level of knowledge and academic skills that will grant access to PhD. programmes in the Computational Sciences or to other scientific research oriented positions.

Article 2.2 – Exit qualifications

The Exit qualifications of the Master's Programme Computational Science are defined as follows:

1. The graduate in Computational Science has a thorough knowledge of modelling and simulation of complex systems, computational methods and techniques and the application of computational methodologies in application fields (ranging from e.g. physics or biology to medical sciences or psychology).
2. The graduate is able to contribute to scientific research in the field of the degree course.
3. The graduate can formulate and solve problems with the aid of abstraction and model forming.
4. The graduate is able to formulate problems both in general terms and in mathematical and technical terms.
5. The graduate is able to clearly express himself/herself both orally and in writing.
6. The graduate is able to analyse, design and implement as part of a team.
7. The graduate has given thought to the social context of the exercise of science in general and the application of computer science in particular.
8. The graduate is able to independently acquire the information and concepts that are necessary when starting up a new project.

Chapter 3. Further admission requirements

Article 3.1 – Admission requirements
Admission to the Master's Programme in Computational Science is granted by the Examinations Board. All students holding an academic Bachelor degree in one of the Sciences or Engineering disciplines may apply for the master. Candidates for the programme should demonstrate sufficient knowledge in mathematics and computing skills before they will be admitted to the programme.
Once accepted onto the programme, an acceptance interview will be held with each student so as to identify strengths and weaknesses and help tailor the student's curriculum.

Article 3.2 – Pre-Master's programme
Not applicable

Article 3.3 – Limited programme capacity
Not applicable.

Article 3.4 – Final deadline for registration
1. A request for admission to the Master's programme must be submitted to StudieLink and the Faculty before 1 May in the case of Dutch students, before 1 April in the case of EU students and before 1 February in the case of non-EU students.
2. Under exceptional circumstances, the Examinations Board may consider a request submitted after this closing date.

Article 3.5 – English language requirements
1. The proficiency requirement in English as the language of instruction can be met by the successful completion of one of the following examinations or an equivalent:
    1. IELTS-test: minimum score 6.5, at least 6 on each sub-score (listening/reading/writing/speaking).
    2. TOEFL Test: the minimum scores required are:
        - Internet-based test (iBT): 90
        - Computer-based test (CBT): 235
        - Paper-based test (PBT): 580

        The TOEFL-code for the Faculty of Science of the Universiteit van Amsterdam is: 8628.
    3. A Cambridge Examination Score with a minimum test result of CAE B will also be accepted. For the CPE test a minimal score of C is required.
2. Those possessing a Bachelor's degree from a Dutch university or having an English-language 'international baccalaureate' diploma satisfy the requirement of sufficient command of the English language.

Article 3.6 – Free curriculum
1. Subject to approval, and only in exceptional cases, the student has the option of compiling a curriculum of his/her own choice which deviates from the curricula prescribed by the programme.
2. The concrete details of such a curriculum must be approved before the start of the Master Thesis by the Examinations Board of the master's programme.
3. The following conditions must at least be met in order to be eligible for the master's degree:
    1. all compulsory components should be part of the student's programme;
    2. the level of the programme must match the objectives and exit qualifications that apply for the programme for which the student is enrolled.

Chapter 4. Curriculum structure

Article 4.1 – Composition of programme

1. The curriculum comprises the following:
    1. Compulsory components: 66 EC (24 EC on core courses in year 1 and 42 EC on core courses in year 2, including the Master Thesis Computational Science of 42 EC in year 2);
    2. Constrained choice components: 30 EC;
    3. Elective components: 24 EC. Elective components enable the student to attend Master components not already mentioned as constrained choice components. Elective components will be chosen with the consent of the Examinations Board.
2. A complete list of components provided by the Master's programme can be found in Appendix 1.
3. Every component will be tested. Within the Master's programme Computational Science different forms of testing are used. This is described per component in the course catalogue.
4. Within the Master's programme Computational Science different types of teaching methods are used. This is described per component in the course catalogue.

Article 4.2 – Compulsory components

Core Courses	
Year 1	**24 EC required**
All these components: Numerical Algorithms (UvA) Introduction to Computational Science (UvA)* * Students with sufficient prior knowledge can replace this component with an additional constrained choice component. Seminars Computational Science (UvA)* * This component runs over year 1 and 2; EC credits are awarded at the end of year 2. Complex System Simulation (UvA)	 6 6 6 6
Year 2	**42 EC required**
Master Thesis Computational Science (UvA)	42

Constrained Choice Courses	
As available/offered	**30 EC required**
Agent-based Modelling	6
Applied Mechanism Design and Big Data (UvA)	6
Biosystems Data Analysis (UvA)	6
Computational Biology (UvA)	6
Computational Intelligence (UvA)	6
Computational Finance (UvA)	6
Data Mining Techniques (VU)	6
Evolutionary Computing (VU)	6
Parallel Programming for High-performance Applications (VU)	6
Parallel Programming Practical (VU)	6
Performance of Networked Systems (VU)	6
Scientific Computing (UvA)	6
Stochastic Simulation (UvA)	6

Article 4.3 – Practical exercise
In addition to, or instead of, classes in the form of lectures, the elements of the Master's programme often include a practical component as defined in article 1.2 of part A.

Article 4.4 – Elective components
1. Elective courses can be chosen from the lists of recommended elective courses below. Please note that these lists are only examples of some of the possible electives. These are not exhaustive lists, and students are free to find other application domains and related courses, or find other courses in the already listed domains.
2. Course choices within an application domain are always in consultation with the Programme Director and Thesis supervisor.

Recommended Elective Courses	**24 EC required**
Application domain Computational Science Core:	
- Behaviour Dynamics in Social Networks	6
- Experimental Design and Data Analysis (VU)	6
- Finite Element Method: Theory and Applications	6
- Information Theory (UvA)	6
- Internet Programming (VU)	6
- Knowledge Representation on the Web (UvA)	6
- Machine Learning 1 (UvA)	6
- Machine Learning for the Quantified Self (VU)	6
- Scientific Visualisation & Virtual Reality (UvA)	6
- The Social Web (VU)	6
Application domain Computational Finance/Economics:	
- Advanced Topics in Computational Finance (UvA)	6
- Bounded Rationality (UvA)	5
- Non-linear Economic Dynamics (UvA)	5
- Quantitative Financial Risk Management (VU)	6
- Stochastic Calculus (UvA)	5
- Stochastic Processes for Finance (VU)	6
Application domain Computational Biology:	
- Algorithms in Sequence Analysis (VU)	6
- Bioinformatics I (UvA)	6
- Bioinformatics II (UvA)	6
- Bioinformatics for Translational Medicine (VU)	6
- Fundamentals of Bioinformatics (VU)	6
Application domain Computational Biomedicine:	
- Biomedical Modelling and Simulation (VU)	6
- From Genome to Physiome (UvA)	6
- Parameter Estimation Applied to Medical and Biological Sciences (VU)	6
- Physics of Organs 1: Cardio-Pulmonary Physics (UvA)	6
- Physics of Organs 2: Sensory Organs and Bioelectricity (UvA)	6
Application domain Computational Chemistry:	
- Biomolecular Simulations (UvA)	6
- Statistical Theory of Complex Molecular Systems (UvA)	6
- Understanding Molecular Simulation (UvA)	6

Application domain High Performance Computing: - Concurrency and Multithreading (VU) - Distributed Systems (VU) - Large-Scale Computing and Infrastructures (VU)	 6 6 6
Application domain Computational Earth Sciences: *(course choices in consultation with the specialisation coordinator)*	
Application domain Scientific Computing, Numerical Math: *(course choices in consultation with the specialisation coordinator)*	

3. An elective component will only be seen as part of the programme if the Examinations Board has given its prior approval.
4. In terms of content, elective components must not show too much similarity with other components of the student's curriculum. The acceptable degree of similarity will be decided by the Examinations Board.
5. The Examinations Board may permit the choice of one or more components from other university-level Master's Programmes. Approval must be obtained prior to enrolling on external courses.

Article 4.5 – Sequence of examinations

1. The student may start with the final project of the study programme (Master Thesis) only if all other compulsory components have been completed and the student has completed all necessary constrained choice courses (30 EC). The student's final study programme must also have been approved by the Examinations Board.
2. In case one or more courses are still to be finished, the programme director and thesis supervisor may agree that Gradation Research can be started.
3. The assessment of projects in which several students have worked on an assignment will only be made at the end of the relevant teaching period. In principle, an individual resit is not possible.

Article 4.6 – Participation in practical exercise and study group sessions

Not applicable.

Article 4.7 – Maximum exemption

1. A student may apply to the Examinations Board for the approval of transfer credits for components taken at a different programme, provided those components have not been used towards a degree at a different university. This is only possible for components at Master's level that are directly relevant to the Master Computational Science programme and only in case there is no overlap with other components taken by the student. By default, all transfer credits are registered with a pass grade and will not be taken into account to compute the student's grade point average.
2. At most 36 EC of the student's programme can consist of such transfer credits.
3. Components successfully completed elsewhere during the programme may supplement the student's examination programme, subject to permission from the Examinations Board.

Article 4.8 – Validity period of examinations

The validity period of interim examinations and exemptions from interim examinations is limited, as described in part A, article 4.8.

Article 4.9 – Degree

Students who have successfully completed their Master's examination are awarded a Master of Science degree. The degree awarded is stated on the diploma.

Article 4.10 –Individual project

1. An individual project may replace an elective component.
2. For that purpose the student will prepare both a subject description including the aim and content of the project, as well as the intended deliverable for assessment. The student will seek a supervisor for the project amongst the staff of the Master programme (or staff of the related research institute).
3. A project may amount to a maximum of 12 EC.
4. The total of individual projects should not be more than 12 EC.
5. Participation in a summer school may also be regarded as a project.
6. The prior approval of the Examinations Board is required for an individual project to be included in the student's study programme.

Article 4.11 – Double Master's programme

In order to be awarded two Master's degrees, the following requirements must be met:

1. The total programme of the candidate should amount to at least 180 EC.
2. The candidate's work for the programme (lectures, research work, etc.), must be of such a standard that all the compulsory requirements of each of the two programmes have been met.
3. The candidate must have conducted separate research work for both Master's degrees. This may consist of two separate Master theses with supervisors from the respective study programmes.
4. The Examinations Boards of both study programmes must approve the student's double Master's programme before the student commences the double Master's programme.

Chapter 5. Transitional and final provisions

Article 5.1 - Amendments and periodic review

1. Any amendment to the Teaching and Examination Regulations will be adopted by the dean after taking advice from the relevant Board of Studies. A copy of the advice will be sent to the authorised representative advisory body.
2. An amendment to the Teaching and Examination Regulations requires the approval of the authorised representative advisory body if it concerns components not related to the subject of Section 7.13, paragraph 2 sub a to g and v, and paragraph 4 of the WHW and the requirements for admission to the Master's programme.
3. An amendment to the Teaching and Examination Regulations is only permitted to concern an academic year already in progress if this does not demonstrably damage the interests of students.

Article 5.2 – Transitional provisions

If the curriculum changes, the new curriculum and regulations also apply to students already enrolled. Students can however request the Examinations Board to have the curriculum as it was when they started their studies apply to then.

Article 5.3 - Publication

1. The Dean of the faculty will ensure the appropriate publication of these Regulations and any amendments to them.
2. The Teaching and Examination Regulations will be posted on the faculty website and deemed to be included in the course catalogue.

Article 5.4 – Effective date

These Regulations enter into force with effect from 1 September, 2016 .
Thus drawn up by the Dean of the Faculty of Science on 18 July 2016 and by the Faculty board (VU) on 14 July 2016.

Appendix 1 List of components provided by the study programme

Component	Code	Study load (EC)	Semester	Teaching method	Assessment
Advanced Topics in Computational Finance (UvA)	5284COFA6Y	6	2	IC	Written, oral
Agent-based Modelling	5284AGBM6Y	6	1	L, PR	Witten
Algorithms in Sequence Analysis (VU)	5304AISA6Y	6	1	L, PR	Written
Applied Mechanism Design and Big Data (UvA)	5284AMDB6Y	6	1	L, CP	Written
Behaviour Dynamics in Social Networks (VU)	52848BDI6Y	6	1	L, PR	Written
Bioinformatics for Translational Medicine (VU)	5304BFTM6Y	6	2	L, PR	Written, oral
Bioinformatics I (UvA)	52841BIO6Y	6	1	IC	Written, oral
Bioinformatics II (UvA)	52842BIO6Y	6	2	IC	Written, oral
Biomedical Modelling and Simulation (VU)	53548BIM6Y	6	1	L, PR	Written, oral
Biomolecular Simulations (UvA)	5254BISI6Y	6	2	L, CP	Written
Biosystems Data Analysis (UvA)	5304BIDA6Y	6	1	L, CP	Written
Bounded Rationality (UvA)	6414M0004Y	5	?	L, CP	Written, oral
Complex System Simulation (UvA)	5284COSS6Y	6	2	L, GP	Written, oral
Computational Biology (UvA)	5284COBI6Y	6	2	L, CP	Written
Computational Intelligence (UvA)	5204COIN6Y	6	1	L, CP	Written, oral
Computational Finance (UvA)	5284COFI6Y	6	2	L, CP	Written
Concurrency and Multithreading (VU)	52848COM6Y	6	1	L, PR	Written
Data Mining Techniques (VU)	52848DAM6Y	6	2	L, PR, GP	Written
Distributed Systems (VU)	52848DIS6Y	6	1	L, PR	Written
Evolutionary Computing (VU)	52848EVC6Y	6	1	L	Written
Experimental Design and Data Analysis (VU)	52848EDD6Y	6	2	L, CP	Written
Finite Element Method: Theory and Applications (UvA)	5284FEMT6Y	6	1	L, CP	Written, oral
From Genome to Physiome (UvA)	5354GETP6Y	6	2	PR	Written
Fundamentals of Bioinformatics (VU)	53048FUB6Y	6	1	L, CP	Written
Master Thesis Computational Science (UvA)	5284MTC42Y	42	1&2	IC	Written, oral
Information Theory (UvA)	5314INTH6Y	6	1	L, PR	Written
Internet Programming (VU)	52848INP6Y	6	1	L	Written
Introduction to Computational Science (UvA)	5284ITCS6Y	6	1	L, PR, CP	Written, oral
Knowledge Representation on the Web (UvA)	5204KROT6Y	6	2	L, PR	Written
Large-Scale Computing Infrastructures (VU)	52848LSC6Y	6	2	L, PR	Written, oral
Machine Learning 1 (UvA)	52041MAL6Y	6	1	L, CP, PR	Written
Machine Learning for the Quantified Self (VU)	52848MLF6Y	6	2	?	?
Non-linear Economic Dynamics (UvA)	6414M0012Y	5	?	L, PR, CP	Written
Numerical Algorithms (UvA)	5284NUAL6Y	6	1	L, CP	Written
Parallel Programming for High-performance Applications (VU)	52848PPF6Y	6	1	L, PR	Written
Parallel Programming Practical (VU)	52848PPP6Y	6	1	PR	Written
Parameter Estimation Applied to Medical and Biological Sciences (VU)	53548PEM6Y	6	2	L	Written
Performance of Networked Systems (VU)	52848PEN6Y	6	2	L	Written
Physics of Organs 1: Cardio-Pulmonary Physics (UvA)	53541PHO6Y	6	1	PR, GP	Written, oral
Physics of Organs 2: Sensory Organs and Bioelectricity (UvA)	53542PHO6Y	6	1	PR, GP	Written, oral
Quantitative Financial Risk Management (VU)		6	2	L	Written
Scientific Computing (UvA)	5284SCCO6Y	6	2	L, CP	Written
Scientific Visualization and Virtual Reality UvA)	5284SVVR6Y	6	1	L	Written, oral
Seminars Computational Science (UvA; runs over year 1 and 2)	5284SECS6Y	6	1	L, PR	Written, oral
Statistical Theory of Complex Molecular Systems (UvA)	5254STTC6Y	6	1	L, PR	Written

Stochastic Calculus (UvA)	6414M0013Y	5	?	L, CP, GP	Written
Stochastic Processes for Finance (VU)	53748SPF6Y	6	1	L, PR	Written
Stochastic Simulation (UvA)	5284STSI6Y	6	1	L, CP	Written
The Social Web (VU)	52948THS6Y	6	2	L, PR	Written
Understanding Molecular Simulation (UvA)	5254UNMS6Y	6	1	L, CP	Written

L = Lectures, CP = Computer practical, PR = practical, IC = Individual coaching, GP = Group project